TFW AF

67,007-005
R4269

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application:	Benda, et al.
Serial No.:	10/039,094
Filed:	01/02/2002
Group Art Unit:	1731
Examiner:	Hoffmann, John M.
For:	LONG PERIOD FIBER BRAGGG GRATINGS WRITTEN WITH ALTERNATE SIDE IR LASER ILLUMINATION

REVISED APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner For Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Subsequent to the filing of the Notice of Appeal on April 27, 2004 and in response to the Notification of Non-Compliance, Applicant hereby submits its Revised Appeal Brief in compliance with 37 C.F.R. 1.192(c). The Commissioner is authorized to charge Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds for any fees or to credit the account for any overpayment.

REAL PARTY IN INTEREST

The real party in interest is United Technologies Corporation, the assignee of the entire right and interest in this Application.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

Claims 1-10 and 21-30 stand finally rejected. Claims 11-20 have been withdrawn. Claims 1-10 and 21-30 are appealed.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF THE INVENTION

The invention involves a method of manufacturing an optical fiber. As shown in Figure 3, the optical fiber 24 extends along an axis (shown as Z). [Specification, p. 6, ll. 4-5]. As shown in Figure 1A, the optical fiber 24 may have layers, such as a core 36, cladding 40 and buffer 44 as shown in Figure 1A. [Specification, p. 5, ll. 17-19]. Generally, light is principally transmitted through core 36, a transmission layer, and alternatively through cladding 40. [Specification, p. 5, ll. 19-20]. Buffer 44 extinguishes light. [Specification, p. 5, l. 20]. The inventive method of manufacture is described broadly by two independent claims: Claim 1 and Claim 26.

As described by independent Claim 1 and shown by Figure 1B, the method includes the steps of directing a first laser beam 48 on a first locality 56 of the optical fiber 24. [Specification, p. 5, ll. 20-23]. A second laser beam 52 is directed on a second

locality 58 of the optical fiber as well. [Specification, p. 5, ll. 20-23]. The second locality is both circumferentially (see Figure 1B) and axially displaced from the first locality (see Figure 3). [Specification, p. 5, ll. 20-23, p. 6, ll. 3- 4]. A grating is formed on the optical fiber. [Specification, p. 6, ll. 4-5; see Claim 1]. Also, as shown in Figure 15, two or more gratings 110, 114 may be formed on the optical fiber. [Specification, p. 9, ll. 25-30; Claim 10].

The first laser beam 48 and the second laser beam 52 may be one and the same laser beam as shown in Figure 1. [Specification, p. 5, ll. 23-24, Claim 2]. In addition, one of the laser beams 48, 52 may arise from a carbon dioxide laser source (Claim 5) or an infrared laser source (Claim 6). [Specification, p. 6, ll. 5-7]. As shown further in Figure 1, the laser beam 48 may trace a scanning pattern 84 (Claim 7). [Specification, p. 7, ll. 2-6]. The laser beam 48 may be activated at predetermined points 88 of the scanning pattern 84 (Claim 8). [Specification, p. 7, ll. 9-12].

Moreover, one of the laser beams 48, 52 can heat the optical fiber to form the grating (Claim 3). [Specification, p. 6, ll. 7-8]. Indeed, as shown in Figure 3, heating may deform the optical fiber 24 about the first locality 56 and the second locality 58 to form the grating 62 (Claim 4). [Specification, p. 6, ll. 7-8]. The index of refraction may also be changed by the process (Claim 24). [Specification, p. 6, ll. 9-10] The first laser beam 48 and the second laser beam 52 may form a bend 62 in the optical fiber 24. (Claim 21). [Specification, p. 6, ll. 12-14]. As shown in Figure 3, the first locality 56 may be spaced a portion of the bend 62 apart from the second locality 58 (Claim 22). [Specification, p. 6, ll. 7-8]. The bends 62 are formed by deforming the optical fiber 24 (Claim 25). [Specification, p. 6, ll.7-8].

As described by independent Claim 26, the method involves the steps of directing a first laser beam 48 on a first locality 56 of an optical fiber 24 having a circumference and directing a second laser 52 beam on a second locality 58 of the optical fiber 24 circumferentially displaced from the first locality 56. [Specification, p. 5, ll. 20-23, p. 6, ll. 3- 4]. The optical fiber 24 is deformed about the first locality 56 through the first laser beam 48 and deformed about the second locality 58 through the second laser beam 52. [Specification, p. 6, ll. 7-8]. Through these steps, a grating is formed on the optical fiber. (Claim 26). [Specification, p. 6, ll. 7-8]. Deforming may involve the forming of bends in the optical fiber (Claim 27) and the alteration of an index of refraction of the optical fiber (Claim 28). [Specification, p. 6, ll. 7-10]. The first locality 56 and the second locality 58 are spaced from each other along an axis of the optical fiber 24 (Claim 29). [Specification, p. 5, ll. 20-23, p. 6, ll. 3- 4]. These steps can be repeated to deform the optical fiber at regular intervals. (Claim 30). [Specification, p. 6, ll. 4-5].

ISSUES

A. Whether Claim 23 is properly rejected under 35 U.S.C. §112, Second Paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

B. Whether Claims 1, 3 and 5 are properly rejected under 35 U.S.C. §102(b) as being unpatentable over *Byron* (U.S. 5,694,502).

C. Whether Claims 1, 3, 5 and 23 are properly rejected under 35 U.S.C.§103(a) as being unpatentable over *Byron* (U.S. 5,694,502).

D. Whether Claim 4 is properly rejected under 35 U.S.C.§103(a) as being unpatentable over *Byron* (U.S. 5,694,502) in view of *Bernstein* (U.S. 6,509,547).

E. Whether Claims 1-3 are properly rejected under 35 U.S.C. §103(a) as being unpatentable over *Kim* (U.S. 6,501,881).

F. Whether Claims 1-2 and 6-10 are properly rejected under 35 §103(a) as being unpatentable over *Prast* (U.S. 5,176,731) and *Nakai* (U.S. 5,996,375).

G. Whether Claims 26-30, 1, 4, and 24-25, are properly rejected under 35 U.S.C.§103(a) as being unpatentable over *Kim* (U.S. 6,430,342).

GROUPINGS OF CLAIMS

A. The rejection of Claim 23 under 35 U.S.C. §112, Second Paragraph, is not contested.

B. The rejection of Claims 1, 3 and 5 under 35 U.S.C. §102(b) as being unpatentable over *Byron* (U.S. 5,694,502) is contested.

C. The rejection of Claims 1, 3, 5 and 23 under 35 U.S.C.§103(a) as being unpatentable over *Byron* (U.S. 5,694,502) is contested.

D. The rejection of Claim 4 under 35 U.S.C.§103(a) as being unpatentable over *Byron* (U.S. 5,694,502) in view of *Bernstein* (U.S. 6,509,547) is contested.

E. The rejection of Claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over *Kim* (U.S. 6,501,881) is contested.

F. The rejection of Claims 1-2 and 6-10 under 35 §103(a) as being unpatentable over *Prast* (U.S. 5,176,731) and *Nakai* (U.S. 5,996,375) is contested. The rejection of Claims 1-2 and 6-10 do not stand or fall together.

G. The rejection of Claims 26-30, 1, 4, and 24-25 under 35 U.S.C. §103(a) as being unpatentable over *Kim* (U.S. 6,430,342) is contested. The rejection of Claims 26-30, 1, 4, and 24-25 do not stand or fall together.

PATENTABILITY ARGUMENTS

A. The rejection of Claim 23 under 35 U.S.C. §112, second paragraph, is not contested.

Applicant does not contest and accordingly accepts the rejection of Claim 23 as proper.

B. The rejection of Claims 1, 3 and 5 under 35 U.S.C. §102(b) is improper.

Claim 1 requires in pertinent part "directing a first laser beam on a first locality" and "directing a second laser beam on a second locality." The first locality is both circumferentially and axially displaced from the second locality on the optical fiber. (Claim 1).

The Examiner rejected Claim 1 under 35 U.S.C. §102(b) as being anticipated by *Byron* (US. 5,694,502). In the Final Office Action, the Examiner argued that, "The first locality corresponds to the left-most portion exposed to and altered by beam 11" while arguing that "The second locality is the portion exposed to beam 14." [See Final Office Action (2/02/04), p. 4]. At the same time, the Examiner noted "*Byron* doesn't explicitly teach the two localities." [Final Office Action (2/02/04), page 4]. In so doing, the Examiner acknowledged that all of the limitations of claim 1 are not shown by *Byron*.

Indeed, beam 14 of *Byron* shines on a locality upon which beam 11 shines. There is no displacement of the second locality from the first locality along the axis of the

optical fiber as required by claim 1 because light 11 is shined along the axis of the fiber and beam 14 is shined along a portion of this locality. Certainly, there is a distinction between *Byron*, which shows shining beam 11 across a large region and focusing beam 14 on a portion of that region, and the present invention as described by Claim 1, which requires the two locations to be distinct both axially and circumferentially.

In the Advisory Action (4/13/04), the Examiner contends that only the left-most portion upon which beam 11 shines should be considered as the first locality. This reading of *Byron* is simply misguided. The locality of beam 11 is not so limited by *Byron*. *Byron*, in fact, indicates and shows that beam 11 is focused by a lens into a line extending substantially along the axis of the fiber. [*Bryon*, Column 1, ll 55-58]. Accordingly, *Bryon* does not read on Claim 1. For these reasons, the rejection of Claims 1, 3 and 5 is improper.

C. The rejection of Claims 1, 3, 5 and 23 under 35 U.S.C.§103(a) as being unpatentable over *Byron* (U.S. 5,694,502) is improper.

The Examiner further rejected claims 1, 3, 5 and 23 under 35 U.S.C. §103(a) as being unpatentable over *Byron*, 5,694,502. In so doing, the Examiner implicitly acknowledges that all the limitations are not shown by a single reference and also expressly notes that *Byron* does not show "two localities". [Final Office Action (2/02/04), p. 4]. With respect to the foregoing claims, however, the Examiner does not make an effort to identify any where in the prior art these missing limitations may be found. Instead, the Examiner merely presumes that the two laser beams are directed at two localities axially and circumferentially displaced from one another. For this reason alone, the rejection is improper.

D. The rejection of Claim 4 under 35 U.S.C.§103(a) as unpatentable over *Byron* (U.S. 5,694,502) in view of *Bernstein* (U.S. 6,509,547) is improper.

The Examiner rejected claim 4 under 35 U.S.C. §103(a) as being unpatentable over *Byron* as applied to claim 3 above, and further in view of *Bernstein, et al.* Claim 4 depends upon claim 1 and 3 and further requires in pertinent part, "the step of deforming the optical fiber about the first locality and the second locality to form the grating on the optical fiber." (Claim 4). The Examiner acknowledges that *Byron* does not teach deforming of the fiber. Instead, the Examiner relies upon *Bernstein, et al.* to meet this limitation. The Examiner appears to contend that motivation exists to combine *Byron* with *Bernstein, et al.* because fibers have protective layers that may require removal prior to forming a grating. Accordingly, the Examiner contends that it would have been obvious to add a protective coating on the *Byron* fiber, and it would be further obvious to add this layer as a precursor step to writing the grating. This reasoning is misplaced. There can be no motivation for the deforming step of *Bernstein, et al.* when there is no such protective coating on the *Byron* fiber in the first place. Therefore, the combination of references is improper for lack of sufficient motivation.

Moreover, Claim 4 specifically requires, "deforming the optical fiber about the first locality and the second locality to form the grating on the optical fiber." There is no teaching in either reference that this step is performed to form a grating. Indeed, the laser beam of *Bernstein, et al.* is insufficient to form the grating because it must be "low enough to maintain the fused silica material of the core 22 and the cladding 24 undamaged." [*Bernstein, et al., et al.*, column 4, ll. 5-7]. Accordingly, the references fail to teach all of the limitations of Claim 4.

The Examiner contends that there is no limitation that the deforming step creates the gratings, stating: "the 'to form the grating' is not interpreted to mean 'thereby forming the grating'." [Advisory Action (4/13/04)]. However, there is no other meaning that "to form the grating" may have. Claim 4 even uses the same forming language as Claim 1 to describe creating the grating. The limitation of deforming the optical fiber to form the grating must be given its ordinary meaning. The Examiner cannot simply choose to ignore this limitation because he cannot find this feature in the cited references. For this added reason, Claim 4 is in condition for allowance.

E. The rejection of Claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over *Kim* (U.S. 6,501,881) is improper.

The Examiner rejected Claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over *Kim*, 6,501,881. The Examiner readily acknowledges that "there is no disclosure of two different localities along the axis." [Final Office Action (2/02/04), p.6]. Instead, the Examiner merely infers this limitation. There is no teaching of this limitation in the prior art. For this reason, Claims 1-3 are allowable over *Kim*.

Apparently, the Examiner argues that it would be obvious to repeat the process of *Kim* so that localities where the laser beams hit would be axially and circumferentially displaced from one another. However, there is no suggestion or motivation in *Kim* to seek out such a modification. Therefore, such a combination is improper.

F. The rejection of Claims 1-2 and 6-10 under 35 §103(a) as unpatentable over *Prast* (U.S. 5,176,731) and *Nakai* (U.S. 5,996,375) is improper.

The Examiner rejected claims 1-2 and 6-10 under 35 U.S.C. §103(a) as being unpatentable over *Prast* (U.S. 5,176,731) and *Nakai* (U.S. 5,996,375). Claims 2 and 6-10 depend upon Claim 1. As noted previously, Claim 1 requires directing a first laser beam on a first locality and directing a second laser beam on a second locality. The first locality axially and circumferentially displaced from the second locality. Neither *Prast, et al.* nor *Nakai, et al.* alone or in combination teach all of the limitations of Claim 1. Specifically, there is no showing of two laser beams directed at two different localities axially and circumferentially displaced from each other.

There is also no motivation for the combination. *Prast, et al.* teaches a technique for performing measurements on an optical fiber using a radiation beam, not a method of forming optical fiber gratings. There is nothing within *Prast, et al.* that indicates the desirability of combining its feature with the features of *Nakai, et al.* As noted by the MPEP:

> The mere fact that references <u>can</u> be combined or modified does not render the resultant combination obvious unless the prior art also suggest the desirability of the combination.

MPEP 2143.01. Because the Examiner can offer no support for the desirability of the combination, the combination is improper and the claims allowable over these references.

Also, *Nakai et al.* teaches away from its combination with *Prast et al.* Specifically, *Nakai et al. relies* upon a mask 3 extending along the axis of the fiber 1 to form a grating as shown in Figure 1A. Hence, light is shown and must necessary fall along the axis of both the mask 3 and fiber to form the grating. Circumferentially

displacing one light beam from another light beam would not allow both beams to pass through the mask 3 to form the grating. Therefore, the combination of references is improper and claims 1-2 and 6-10 are in condition for allowance.

The rejection of claims 1-2 and 6-10 do not stand or fall together. Claim 7 requires "at least one of the laser beams traces at least in part a scanning pattern." [Claim 7]. This limitation is not recited by claims 1-2 and 6, 9 or 10 and is also not shown by the cited reference. Examiner contends that a scanning pattern is shown. However, the Examiner fails to identify this pattern in the cited references. Accordingly, the rejection of Claim 7 is improper and claim 7 is separately patentable.

Also, claim 8 depends upon Claim 7 and further requires the laser beam to be activated at predetermined points of the scanning pattern. This feature is not recited by claims 1-2, 6-7, 9 or 10 and is also not shown by the cited references. The Examiner contends that the laser beam of *Prast et al.* is activated at predetermined points. However, the Examiner fails to demonstrate how the laser beam is activated "at predetermined point of the scanning pattern" as expressly required by claim 8. Because no such feature is shown in the cited reference, claim 8 is separately patentable.

G. The rejection of Claims 26-30, 1, 4, and 24-25 under 35 U.S.C.§103(a) as being unpatentable over *Kim* (U.S. 6,430,342) is improper.

Independent Claim 26 requires "directing a first laser beam on a first locality of an optical fiber" and "directing a second laser beam on a second locality of the optical fiber". The first locality is circumferentially displaced from the second locality. The optical fiber is deformed about the first locality through the first laser beam and about the

second locality through the second laser beam. Through this process of deformation, a grating is formed. (Claim 26).

Pursuant to 35 U.S.C. §103(a), the Examiner rejected this claim in view of *Kim* (U.S. 6,430,342). In the Final Office Action (2/02/04), the Examiner notes that Figure 1 of *Kim* discloses using a laser to deform the optical fiber. The Examiner acknowledges that *Kim* does not show two laser beams that create deformations. Instead, the Examiner contends that Figure 2 of *Kim* requires placing deformations on the opposite side of the optical fiber, also citing a passage from *Kim* (column 2, lines 2-9). Based on this alleged requirement, the Examiner contends it would have been obvious to use a second laser beam to create a deformation on the other side of the optical fiber.

However, there is no such requirement in *Kim* of placing deformations on the opposite side of the optical fiber. Indeed, neither Figure 2 nor the cited passage of *Kim* indicates such a requirement. In fact, *Kim* expressly states that the optical fiber of Figure 2 is manufactured "in the same manner" as the optical fiber of Figure 1. [*Kim*, column 2, ll 4-6]. Accordingly, without such a requirement, it would not be obvious to use a second laser to create deformations circumferentially displaced from one another as required by Claim 26. Therefore, Claim 26 and its dependents, Claims 27-30, stand in condition for allowance.

There is also no motivation or suggestion for the technique of *Kim* as described by Figures 1 and 2 with another laser to create deformations circumferentially displaced from one another. The Examiner incorrectly relies on Figure 2 and the cited passage for such support. For this additional reason, these claims are in condition for allowance.

Claim 29 depends upon Claim 26 and further requires "the first locality and the second locality are spaced from each other along an axis of the optical fiber." [Claim 29]. This feature is not recited by the other claims or shown by the cited reference. The Examiner contends that regions 30' are the localities axially spaced from one another. However, the Examiner fails to show that these regions are formed by lasers incident on localities both axially and circumferentially displaced from one another. For this reason, Claim 29 is separately patentable.

For much the same reason as above, Claim 1 is also allowable. Claim 1 requires a first laser beam directed on first locality and a second laser beam directed on a second locality, the first locality is both circumferentially and axially displaced from the second locality. (Claim 1). *Kim* does not show these features. Accordingly, Claim 1 is separately patentable.

CONCLUSION

For the foregoing reasons, Applicant requests allowance of Claims 1-10 and 21-22 and 24-30.

Respectfully submitted,

CARLSON, GASKEY & OLDS

By: _____

Anthony P. Cho
Registration No. 47,209
400 W. Maple Rd., Ste. 350
Birmingham, MI 48009
(248) 988-8360

Dated: August 9, 2004

CERTIFICATE OF MAILING

I hereby certify that the enclosed **Appeal Brief (in triplicate)** is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on August 9, 2004.

Theresa M. Palmateer

N:\Clients\UNITED TECHNOLOGIES\IP00005\patent\Appeal Brief.doc

APPENDIX OF CLAIMS

1. A method of optical fiber manufacture comprising the steps of:

A) directing a first laser beam on a first locality of an optical fiber having a circumference and extending along an axis;

B) directing a second laser beam on a second locality of the optical fiber circumferentially displaced from the first locality, wherein the second locality is also displaced from the first locality along the axis of the optical fiber ; and

C) forming a grating on the optical fiber.

2. The method of optical fiber manufacture of Claim 1 wherein the first laser beam comprises the second laser beam.

3. The method of optical fiber manufacture of Claim 1 wherein at least one of the laser beams heats the optical fiber to form the grating.

4. The method of optical fiber manufacture of Claim 3 including the step of deforming the optical fiber about the first locality and the second locality to form the grating on the optical fiber.

5. The method of optical fiber manufacture of Claim 1 wherein at least one of the laser beams arises from a carbon dioxide laser source.

6. The method of optical fiber manufacture of Claim 1 wherein at least one of the laser beams arises from an infrared laser source.

7. The method of optical fiber manufacture of Claim 1 wherein at least one of the laser beams traces at least in part a scanning pattern.

8. The method of optical fiber manufacture of Claim 7 wherein at least one of the laser beams arises from a laser source activated at predetermined points of the scanning pattern.

9. The method of optical fiber manufacture of Claim 1 wherein the optical fiber comprises a transmission layer and a cladding layer.

10. The method of optical fiber manufacture of Claim 9 wherein at least two gratings are formed.

21. The method of optical fiber manufacture of Claim 1 wherein the first laser beam and the second laser beam form a bend in the optical fiber.

22. The method of Claim 21 wherein the first locality is a portion of the bend apart from the second locality.

23. The method of Claim 1 wherein steps A and B are repeated so that the first locality is axially displaced from the second locality at regular intervals.

24. The method of Claim 4 wherein deforming comprises changing an index of refraction of the optical fiber.

25. The method of Claim 4 wherein deforming comprises forming a bend in the optical fiber.

26. A method of optical fiber manufacture comprising the steps of:

A) directing a first laser beam on a first locality of an optical fiber having a circumference;

B) directing a second laser beam on a second locality of the optical fiber circumferentially displaced from the first locality;

C) deforming the optical fiber about the first locality through the first laser beam;

D) deforming the optical fiber about the second locality through the second laser beam; and

E) forming a grating on the optical fiber through steps C) and D).

27. The method of optical fiber manufacture of Claim 26 wherein deforming comprises forming bends in the optical fiber.

28. The method of optical fiber manufacture of Claim 26 wherein deforming comprises altering an index of refraction of the optical fiber.

29. The method of optical fiber manufacture of Claim 26 wherein the first locality and the second locality are spaced from each other along an axis of the optical fiber.

30. The method of optical fiber manufacture of Claim 26 wherein steps A) - D) are repeated to deform the optical fiber at regular intervals.